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DIVISION OF DATA ANALYSIS AND DISSEMINATION

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Edited by

David S. Stoller

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DIVISION OF DATA ANALYSIS AND DISSEMINATION

TECHNICAL NOTES

TN-1 ANALYZING DIFFERENCES IN THE GROWTH OF TWO RATIOS. Edward K. Zabrowski, May 24, 1966.

TN-2 (Cancelled. Replaced by TN-43).

TN-3 CONSTRUCTING A MINIMAL-LENGTH AREA-CONSERVING FREQUENCY POLYGON FROM GROUPED DATA. C. Marston Case, July 15, 1966.

TN-4 EDUCATIONAL QUALITY: DEFINITION AND MEASUREMENT. Frederic D. Weinfeld, September 2, 1966. ED 014089

TN-5 PROGRAM-BUDGETING FOR EDUCATION. Howard L. Vincent, September 15, 1966. ED 012970

TN-6 THE ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT 1966 SYMPOSIUM ON THE APPLICATION OF OPERATIONS ANALYSIS TO EDUCATIONAL PROBLEMS. David S. Stoller, October 6, 1966. ED 013219

TN-7 A TECHNIQUE FOR PROJECTION OF OCCUPATIONAL-EDUCATIONAL REQUIREMENTS FOR STATE EDUCATIONAL PLANNING AREAS. William C. Morsch, November 18, 1966.

TN-8 AN EXAMINATION OF DATA ON IOWA SCHOOL CHILDREN TO DETERMINE PATTERNS OF PERFORMANCE. Abt Associates, Inc., November 17, 1966. ED 012487

TN-9 AN AGE-SPECIFIC SCHOOL ATTENDANCE PROFILE FOR DROP-OUT ANALYSIS. Stanford Research Institute, November 17, 1966. ED 012480

TN-10 ON DEPARTURES FROM INDEPENDENCE IN CROSS-CLASSIFICATIONS. C. Marston Case, November 18, 1966.

TN-11 BIRTH AND DEATH RATE PROJECTIONS USED IN STUDENT-TEACHER POPULATION GROWTH MODELS. Tetsuo Okada, November 14, 1966.

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TN-13 SOME QUANTITATIVE ASPECTS OF THE INSTRUCTIONAL PROCESS. William J. Gavin and Murray Spitzer, December 9, 1966. ED 013851

TN-14 AN OVERVIEW OF THE ELEMENTARY AND SECONDARY COST-EFFECTIVENESS MODEL AND SUBMODELS. Abt Associates, Inc., December 9, 1966. ED 013281

TN-15 THE SCHOOL SUBMODEL. Abt Associates, Inc., December 9, 1966. ED 013281

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TN-17 THE COMMUNITY SUBMODEL. Abt Associates, Inc., December 9, 1966. ED 013281

TN-18 THE COST SUBMODEL. Abt Associates, Inc., December 9, 1966. ED 013281

TN-19 THE EFFECTIVENESS SUBMODEL. Abt Associates, Inc., December 9, 1966. ED 013281

TN-20 THE COMPUTATION. Abt Associates, Inc., December 9, 1966. ED 013281

TN-21 FACTOR ANALYSES OF ACHIEVEMENT MEASURES FROM THE EDUCATIONAL OPPORTUNITIES SURVEY. George W. Mayeske and Frederic D. Weinfeld, January 18, 1967. ED 013280

TN-22 EDUCATIONAL ACHIEVEMENT AMONG MEXICAN AMERICANS: A SPECIAL REPORT FROM THE EDUCATIONAL OPPORTUNITIES SURVEY. George W. Mayeske, January 9, 1967.

TN-23 (Cancelled)

TN-24 URBAN EDUCATION SYSTEMS ANALYSIS. Stephen C. Clark, Richard J. O'Brien and C. Marston Case, January 20, 1967. ED 013528

TN-25 REPORT ON THE ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT 1967 CONFERENCE ON SYSTEMS TECHNIQUES IN EDUCATIONAL PLANNING. David S. Stoller, February 10, 1967. ED 012518

TN-26 A STUDY OF LONGITUDINAL PATTERNS OF FAILURE AMONG HIGH SCHOOL DROP-OUTS AND POORLY PERFORMING GRADUATES. Abt Associates, Inc. February 16, 1967. ED 012486

TN-27 COST-BENEFIT ANALYSIS OF EDUCATION. Alexander M. Mood and Richard Powers, March 30, 1967. ED 012519

TN-28 DROP-OUT AND RETENTION METHODOLOGY USED TO ESTIMATE FIRST STAGE ELEMENTS OF THE TRANSITION MATRICES FOR DYNAMOD II. John T. Hudman and Edward K. Zabrowski, April 20, 1967.

TN-29 (Cancelled)

TN-30 COST MODEL FOR LARGE URBAN SCHOOLS. Richard J. O'Brien, April 26, 1967. ED 013527

TN-31 (Cancelled)

TN-32 ITEM RESPONSE ANALYSES OF THE EDUCATIONAL OPPORTUNITIES SURVEY TEACHER QUESTIONNAIRE. George W. Mayeske, Frederic D. Weinfeld, and Albert E. Beaton, Jr., May 18, 1967.

TN-33 (Cancelled)

TN-34 STUDENT-TEACHER POPULATION GROWTH MODEL: DYNAMOD II. Edward K. Zabrowski, John T. Hudman, Tetsuo Okada, and Judith R. Zinter, May 29, 1967.

TN-35 AN ALGORITHM TO DETERMINE RELATIVE IMPORTANCE OF PROJECTS. William K. Winters, May 31, 1967.

TN-36 METHODS OF PROJECTING BIRTHS. Tetsuo Okada, June 1, 1967.

TN-37 (Cancelled)

TN-38 SCHOOL SUBMODEL FOR LARGE URBAN SCHOOLS. Richard J. O'Brien, June 21, 1967. ED 013500

TN-39 METHODOLOGY USED TO ESTIMATE FIRST-STAGE ELEMENTS OF THE TRANSITION PROBABILITY MATRICES FOR DYNAMOD II: TEACHERS AND EXTRA-SYSTEM FLOWS. Edward K. Zabrowski, September 18, 1967.

TN-40 ESTIMATION OF SECOND-STAGE DROPOUT RATES FOR DYNAMOD II. Judith R. Zinter, August 28, 1967.

TN-41 TWO COMPUTER PROGRAMS FOR FACTOR ANALYSIS. Carl E. Wisler, October 18, 1967.

TN-42 TRANSITION PROBABILITIES FOR STUDENT-TEACHER POPULATION GROWTH MODEL (DYNAMOD II). Judith R. Zinter, September 8, 1967.

TN-43 A BIBLIOGRAPHIC GUIDE TO OPERATIONS ANALYSIS OF EDUCATION. C. Marston Case and Stephen C. Clark, September 15, 1967.

TN-44 (Cancelled - Superseded by TN-65)

TM-45 DYNAMOD II IN A TIME-SHARING ENVIRONMENT. William K. Winters, October 23, 1967.

TM-46 METHODOLOGY FOR AN EDUCATIONAL ATTAINMENT MODEL. Carl E. Wisler, September 5, 1967.

TM-47 OCCUPATION EDUCATION REQUIREMENTS ANALYSIS. William C. Morsch and Jeanne Griest, December 12, 1967.

TM-48 A MODEL FOR STUDENT ACHIEVEMENT. George W. Mayeske, December 21, 1967.

TM-49 CORRELATIONAL AND FACTORIAL ANALYSES OF ITEMS FROM THE EDUCATIONAL OPPORTUNITIES SURVEY TEACHER QUESTIONNAIRE. Frederic D. Weinfeld, George W. Mayeske, and Albert E. Beaton, Jr., December 29, 1967.

TM-50 CORRELATIONAL AND REGRESSION ANALYSES OF SCHOOL ACHIEVEMENT FOR SCHOOLS OF VARYING RACIAL COMPOSITION. Frederic D. Weinfeld, George W. Mayeske, and Albert E. Beaton, Jr., December 29, 1967.

TM-51 ITEM RESPONSE ANALYSES OF THE EDUCATIONAL OPPORTUNITIES SURVEY 9th GRADE STUDENT QUESTIONNAIRE. Frederic D. Weinfeld, George W. Mayeske, and Albert E. Beaton, Jr., December 29, 1967.

TM-52 ON PARTITIONING THE EXPLAINED VARIATION IN A REGRESSION ANALYSIS. Carl E. Wisler, January 17, 1968.

TM-53 DYNAMICS OF ACHIEVEMENT: A STUDY OF DIFFERENTIAL GROWTH ACHIEVEMENT OVER TIME. Tetsuo Okada, David S. Stoller, and Frederic D. Weinfeld, January 17, 1968.

TM-54 DYNAMICS OF ACHIEVEMENT: DIFFERENTIAL GROWTH OF ACHIEVEMENT FOR NEGRO AND WHITE STUDENTS BY SMSA/NON-SMSA AND REGION. Tetsuo Okada and David S. Stoller, January 17, 1968.

TM-55 A MODEL FOR THE DETERMINATION OF SCHOOL ATTENDANCE AREAS UNDER SPECIFIED OBJECTIVES AND CONSTRAINTS. Richard J. O'Brien, January 22, 1968.

TM-56 RESEARCH ON ACHIEVEMENT DETERMINANTS IN EDUCATIONAL SYSTEMS: A SURVEY. Jerolyn R. Lyle, January 22, 1968.

TM-57 OUTLINE OF AN URBAN EDUCATIONAL MODEL. Richard J. O'Brien, and Jerolyn R. Lyle, January 22, 1968.

TM-58 ITEM RESPONSE ANALYSES OF THE EDUCATIONAL OPPORTUNITIES SURVEY PRINCIPAL QUESTIONNAIRE. George W. Mayeske, Kenneth A. Tabler, John M. Proshek, Fred Weinfeld, and Albert Beaton, March 11, 1968.

TN-59 CORRELATIONAL AND FACTORIAL ANALYSES OF ITEMS FROM THE NINTH GRADE STUDENT QUESTIONNAIRE OF THE EDUCATIONAL OPPORTUNITIES SURVEY. George W. Mayeske, Fred Weinfeld, and Albert Beaton, March 11, 1968.

TN-60 CORRELATIONAL AND FACTORIAL ANALYSES OF ITEMS FROM THE TWELFTH GRADE STUDENT QUESTIONNAIRE OF THE EDUCATIONAL OPPORTUNITIES SURVEY. George W. Mayeske, John M. Proshek, and Wallace M. Cohen, April 26, 1968.

TN-61 CORRELATIONAL AND REGRESSION ANALYSES OF DIFFERENCES BETWEEN THE ACHIEVEMENT LEVELS OF NINTH GRADE SCHOOLS FROM THE EDUCATIONAL OPPORTUNITIES SURVEY. George W. Mayeske, Kenneth A. Tabler, Fred Weinfeld, Albert Beaton, and John M. Proshek, March 11, 1968.

TN-62 CORRELATIONAL AND FACTORIAL ANALYSES OF ITEMS FROM THE EDUCATIONAL OPPORTUNITIES SURVEY PRINCIPAL QUESTIONNAIRE. George W. Mayeske, Kenneth A. Tabler, Fred Weinfeld, Albert Beaton, and John M. Proshek, April 26, 1968.

TN-63 CHARACTERISTICS DIFFERENTIATING UNDER- AND OVERACHIEVING ELEMENTARY SCHOOLS. William B. Fetters, Elmer F. Collins, and Jack W. Smith, March 12, 1968.

TN-64 ITEM RESPONSE ANALYSES OF THE EDUCATIONAL OPPORTUNITIES SURVEY STUDENT QUESTIONNAIRES. George W. Mayeske, Frederic D. Weinfeld, Albert E. Beaton, Jr., Walter Davis, William B. Fetters, and Eugene E. Hixson, April 1968.

TN-1 ANALYZING DIFFERENCES IN THE GROWTH OF TWO RATIOS. Edward K. Zabrowski, May 24, 1966.

It is shown that time differences in the rates of growth of the two ratios can be factored into (1) intercept differences, (2) numerator differentials, (3) denominator differentials, and (4) a covariance between (2) and (3). One of the ratios is selected as a standard and the other's performance is compared against it. Intercept differences are removed by creating a theoretical ratio equal to the product of the comparison ratio and the gross growth rate of the reference standard ratio. The difference between the theoretical ratio and the comparison ratio is then factored into numerator and denominator growth differences, and covariance. Next it is shown that if the deviations between the theoretical and comparison ratio parts (numerators or denominators) are small, the covariance will be small. For the example of personal income, the implication is that tendencies toward racial discrimination can be measured if the covariation is small (other factors, such as productivity, equal). Two potential uses are discussed.

TN-2 (Cancelled. Replaced by TN-43)

TN-3 CONSTRUCTING A MINIMAL-LENGTH AREA-CONSERVING FREQUENCY POLYGON FROM GROUPED DATA. C. Marston Case, July 15, 1966.

The analysis of grouped observations and the problem of their graphic presentation is discussed. The definitions underlying the theory are developed and in order to compare the graphic presentations, histograms and frequency polygons four parts are considered: (1) the base line upon which the histogram or FP is constructed;(2) and (3) the two sides, which rise vertically from both

ends of the base line; (4) the upper outline (UO) which comprises the remainder of the histogram or frequency polygon. A method is given for (a) finding the minimal length area-conserving segments for a given frequency rectangle and (b) establishing the length of the upper line.

TN-4 EDUCATIONAL QUALITY: DEFINITION AND MEASUREMENT. Frederic D. Weinfeld, September 2, 1966.

The problem of defining what is meant by quality in education is addressed. It is suggested that the educational output of schools be used as the criteria for quality instead of the usual descriptive information about the schools and their practices. The change in student level of educational achievement is seen as a logical criterion measure of the quality of schools. Various efforts, past and present, in the measurement of school quality are discussed. It is suggested that school systems should be evaluated using the criterion of system efficiency as measured by output per unit input within classifications of schools according to their size, funds available, type of school, etc.

(Available through ERIC No. ED 014089)

TN-5 PROGRAM BUDGETING FOR EDUCATION. Howard Vincent, September 15, 1966.

A list of general educational program categories is suggested, and several tables showing federal, state, and local financial support for some programs for the years 1959-60 and 1961-62 are displayed. It is demonstrated that these data do not provide sufficient program budgeting information nor are they related to program-oriented end products. Moreover, there is a lack of clarity as to the actual source of educational funds. In general, educational statistics have been gathered for a number of special purposes without regard to a comprehensive information system. Many statistics are assembled to meet ad hoc needs, with no particular regard for the overall problem of evaluation. The financial reporting system therefore reflects a collection of ad hoc needs rather than those specifically needed for program management. Definition of data needs is required for aggregation of local, state, federal, and private sources data for use in evaluating policy objectives, measuring alternative resource allocations, or assessing the returns to investment in specific program elements.

(Available through ERIC No. ED 012970)

TM-6 THE ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT 1966 SYMPOSIUM ON THE APPLICATION OF OPERATIONS ANALYSIS TO EDUCATIONAL PROBLEMS. David S. Stoller, October 6, 1966.

This symposium contributed to an extensive program of the Organization for Economic Cooperation and Development (OECD) to stimulate scientific cooperation among member nations. The program procedure followed puts technical experts in touch with key managerial personnel who have administrative responsibility for employing new technology. In this instance, the symposium was regionally oriented to Scandinavia, and the managerial elements were mostly from the Norwegian educational system, which was well represented and included the Deputy Undersecretary of State for Education, key directors in the Norwegian Ministry of Education, and a large number of regional superintendents of education. The Operations Research (OR) experts were drawn from Western Europe and the United States. Presentations were given on OR studies of educational problems and OR techniques which could be applied to education problems. Discussions of technical problems by educational managers with the OR experts were held to explore possible solutions utilizing OR techniques.

(Available through ERIC No. ED 013219)

TM-7 A TECHNIQUE FOR PROJECTION OF OCCUPATIONAL EDUCATIONAL REQUIREMENTS FOR STATE EDUCATIONAL PLANNING AREAS. William C. Morsch, November 18, 1966.

The objective of the proposed technique is to provide projections of vocational education needs based on projections of employment by major industries. The technique calls for projections at major Standard Metropolitan Statistical Area (SMSA) and rest-of-state levels. Employment projections for 11 industries by state and selected SMSA's are the basis of the model. Employment projections for industries are allocated among occupations according to coefficients produced from the 1960 Census. By means of a conversion matrix, the occupations are transformed into educational requirements using 7 major vocational education fields. Results of the calculation indicate the number of people who will be employed in jobs for which training in a specific vocational field would have equipped them. The technique is designed to allow comparison with projections of other agencies. Details of the two computer programs used are described in an appendix.

TN-8 AN EXAMINATION OF DATA ON IOWA CHILDREN TO DETERMINE PATTERNS OF PERFORMANCE. Abt Associates, Inc., November 17, 1966.

As part of their work in preparing an education cost-effectiveness model, the investigators studied longitudinal data on Iowa school children. The researchers were looking for patterns of early academic performance which would serve as evidence of later failures. In general, patterns for low performance disadvantaged children were mixed. Several different types of patterns were identified: (1) Spread of effects, where early limited failure tends to generalize to several areas; (2) Convergence of effects, where many early failures narrow to one or two key areas; (3) Parallel effects, where students do poorly in one or a number of areas, but the patterns remain the same; (4) Diamond pattern, where early failure will be limited, will expand to a number of areas, and will finally diminish.

(Available through ERIC No. ED 012487)

TN-9 AN AGE-SPECIFIC SCHOOL ATTENDANCE PROFILE FOR DROP-OUT ANALYSIS. Stanford Research Institute, November 17, 1966.

From their examinations of Census data, the investigators suggest the following hypotheses in drop-out rates: (1) Drop-out is more strongly associated with parental education than with family income; (2) drop-out rates are higher for rural than for urban children; (3) for a given level of permanent family income and parental education, there is no significant difference between drop-out rates of white and non-white children; (4) there is a positive correlation between the tendency to be below modal grade for the age group at age N, and being a drop-out at age N + 1; (5) there is a high negative correlation between family income level and the pupil being below modal grade for his age group; and (6) being below modal grade is a function of parental education.

(Available through ERIC No. ED 012480)

TN-10 ON DEPARTURES FROM INDEPENDENCE IN CROSS-CLASSIFICATIONS. C. Marston Case, November 18, 1966.

This note is concerned with the concepts involved in cross-classification of observations. Primary concern is directed toward two-dimensional cross-classifications. A conceptual framework for the characterization and

and comparison of cross-classification is established. Some of the existing methods for characterization of cross-classifications are discussed and a new approach is proposed for characterizing and making inferences from cross-classifications. An indication is given for treating Markov processes as cross-classifications. There are numerous examples which clarify the presentation of the material. This note unifies material from diverse sources.

TN-11 BIRTH AND DEATH PROJECTIONS USED IN STUDENT-TEACHER POPULATION GROWTH MODELS. Tetsuo Okada, November 14, 1966.

This note presents a brief description of the methodology used to project births and deaths in DYNAMOD II (See TN-34). For death rates, the most recently available data (1964) by sex and race was used and assumed to be constant over the period of projection. For projected number of births, Grabill's marriage-parity-progression method was employed. This method takes account of the variables of marriage, parity (number of previous children born), and birth interval (time between marriage and successive children).

TN-12 ESTIMATION OF AGE TRANSITION PROBABILITIES. Judith R. Zinter, December 8, 1966.

This note describes the procedure followed in estimating age transitions for DYNAMOD II, a computerized Markov chain model characterizing the flow of students and teachers through the educational system over time (See TN-34).. The age transitions are presented in the form of probability matrices, one for each sex-race group. By means of these matrices, one can find the probability that an individual will (1) remain in a given age group, (2) move into the next age group, or (3) die. The age groups for which transition probabilities are estimated are 0-4, 5-14, 20-24 25-44 years old, and 44 years old and over.

TN-13 SOME QUANTITATIVE ASPECTS OF THE INSTRUCTIONAL PROCESS. William J. Gavin and Murray Spitzer, December 9, 1966.

Recent emphasis on equal educational opportunity has called for an increased need for knowledge of the basic mechanisms of the educational process. Particularly pertinent today is knowledge of the influence of environment on achievement. In one study cited in this note, the researcher developed a correlation between drop-out rate and median monthly rental of the community. However, perhaps the most promising source of information on the factors influencing achievement is the 1966 survey report by the Office of Education, Equality of Educational Opportunity.

TN-14 AN OVERVIEW OF THE ELEMENTARY AND SECONDARY COST-EFFECTIVENESS MODEL AND SUBMODELS. Abt Associates, Inc., December 9, 1966.

This paper summarizes highlights of the design concept of an elementary and secondary cost-effectiveness model. The paper briefly discusses five submodels and their interrelationships and functions: (1) school; (2) instructional process; (3) community interactions; (4) costs and (5) cost-effectiveness. The School submodel is the production process of the system. The Instructional Process submodel computes the specific improvements in student achievement and attitude. The Community Interactions submodel estimates the impact on seven community variables of the changes in education system output. The Cost submodel accounts for all direct and indirect costs required to implement incremental educational programs. The Effectiveness submodel is the program in which the analysis and the output of the results determined by the other submodels are computed and summarized.

(Available through ERIC No. ED 013281)

TN-15 THE SCHOOL SUBMODEL. Abt Associates, Inc., December 9, 1966.

The School submodel is one of several submodels which comprise the design for an "Elementary and Secondary Cost-Effectiveness Model," (See TN-14). The School submodel has three major subroutines: the school flow matrix,

course of study selection, and drop-out routine. The school flow matrix consists of nodes at each grade/achievement point. Using probabilities of success or failure at each point, this subroutine calculates the numbers of students progressing from kindergarten through high school graduation. The course of study selection subroutine allocates students of a district among the available courses of study. Ultimately the graduation from a particular course will be linked to earnings potential. The change in drop-outs as a result of incremental educational program changes is calculated by the drop-out subroutine.

(Available through ERIC No. ED 013281)

TN-16 THE INSTRUCTIONAL PROCESS SUBMODEL. Abt Associates, Inc., December 9, 1966.

The Instructional Process Submodel is one of several submodels which comprise the design for an "Elementary and Secondary Education Cost-Effectiveness Model," (See TN-14). Basic to operation of the model is the determination of the effects on attainment of alternative educational proposals. Computations to determine these effects are carried out in this submodel. Underlying the Instructional Process Submodel is the hypothesis that the culturally-disadvantaged child fails in school because he is not sensitized to the scholastic environment.

(Available through ERIC No. ED 013281)

TN-17 THE COMMUNITY SUBMODEL. Abt Associates, Inc., December 9, 1966.

The Community Submodel is one of several submodels which comprise the design for an "Elementary and Secondary Education Cost-Effectiveness Model," (See TN-14). This submodel is a set of subroutines which convert data base information, instructional process, attitudinal data, and school submodel achievement data into indicators of community factors. Typical is the earnings potential subroutine. This is a procedure for quantitatively assessing the impact of a proposed educational program upon the ability of the target population to earn a living. Another subroutine correlates achievement scores with social origins. If the correlation is low, equality of educational opportunity is presumed to be high.

(Available through ERIC No. ED 013281)

TN-18 THE COST SUBMODEL. Abt Associates, Inc., December 9, 1966.

The Cost Submodel is one of several submodels which comprise the design for an "Elementary and Secondary Education Cost-Effectiveness Model," (See TN-14). This model computes the total cost of an incremental educational program, including direct and indirect expenditures. To accomplish the latter, the model will compare resources currently available in the school with their utilization rate to arrive at an evaluation of resources available to fill supporting requirements. In addition, editing and diagnostic error routines are built into the Cost Submodel.

(Available through ERIC No. ED 013281)

TN-19 THE EFFECTIVENESS SUBMODEL. Abt Associates, Inc., December 9, 1966.

The Effectiveness Submodel is one of several submodels which comprise the design for an "Elementary and Secondary Education Cost-Effectiveness Model," (See TN-14). The function of the Effectiveness Submodel is to receive the outputs of four operating submodels of the system, plus information from the updated data base, and provide output for the user. Outputs will show the changed values for the variables of interest, as a result of the implementation of the proposed programs.

(Available through ERIC No. ED 013281)

TN-20 THE COMPUTATION. Abt Associates, Inc., December 9, 1966.

The Computation Submodel covers operation of the cost-effectiveness model for educational proposals (See TN-14). It can be used to evaluate alternative proposals for particular communities. The three areas of interest in the calculation are: (1) data base preparation, (2) model operation, and (3) cost-effectiveness analysis and presentation of results.

(Available through ERIC No. ED 013281)

TN-21 FACTOR ANALYSES OF ACHIEVEMENT MEASURES FROM THE EDUCATIONAL OPPORTUNITIES SURVEY. George W. Mayeske and Frederic D. Weinfeld, January 18, 1967.

Factor analyses were conducted on the five ninth-grade achievement measures from the Educational Opportunities Survey (EOS). The five measures are:

(1) Non-Verbal Ability; (2) Verbal Ability; (3) Reading Comprehension; (4) Mathematics Achievement and; (5) General Information. Analyses were performed for ten different racial, ethnic and regional groups as well as for the total ninth grade sample. The first principal component for the total ninth grade sample accounted for approximately seventy-five percent of the variance among the intercorrelations. The relative ordering of the achievement measures on this first factor from highest to lowest were: Verbal; General Information; Reading Comprehension; Math Achievement; and Non-Verbal. This same trend for the magnitude of the first factor and the relative ordering of the achievement measures was found for the other ten groupings. It was concluded that a single achievement composite rather than five separate ones could be used in future analyses and that this could be obtained by utilizing the weights from the first principal component of the total ninth grade. Means, standard deviations, intercorrelations, and factor weights are exhibited for each group.

(Available through ERIC No. ED 013280)

TN-22 EDUCATIONAL ACHIEVEMENT AMONG MEXICAN-AMERICANS: A SPECIAL REPORT FROM THE EDUCATIONAL OPPORTUNITIES SURVEY. George W. Mayeske, January 9, 1967.

This report summarizes findings from the Educational Opportunities Survey (EOS) that are of particular relevance to Mexican-Americans. Some of these findings show that: approximately twenty percent of the differences in achievement among Mexican-American students could be attributed to the differences in the kinds of schools they attend and that this dependence is about one and one-half to two times as great as for the white majority; at the 16-17 year-age level 20 percent more of white than Mexican-Americans are enrolled in school; use of a language other than English in the home may detract from achievement but the possession of verbally enriching materials in the home (such as newspaper, magazines, and an encyclopedia) and kindergarten attendance may facilitate achievement; the economic and educational circumstances of the parents as well as their involvement in the child's education were found to substantially influence achievement; the influence of parental involvement increased over the years; the achievement test scores of Mexican-American students increased as the proportion of white students in the school increased and this trend was more pronounced in the later grades; teacher attributes such as years of experience and education have an appreciable relationship with student achievement; and

Mexican-American students who believe that "hard work" is more important for success than is "good luck" score approximately eight points higher in achievement than those who believe "good luck" is more important.

TN-23 (Cancelled)

TN-24 URBAN EDUCATION SYSTEMS ANALYSIS. Stephen C. Clark, Richard J. O'Brien, and C. Marston Case, January 20, 1967.

This note describes a conceptual model to be used in aiding educational planners evaluate policy relative to the location and concentration of educational facilities within urbanized areas. The note is intended to indicate the scope and the nature of the factors to be included in the analysis of these decisions. Certain submodels are described: the urban submodel; the school submodel; and the cost submodel. The urban submodel is described by areal units which are defined by their location and the socio-economic characteristics of their inhabitants. The school submodel is described by functional classifications of school plant floor areas and personnel staffing ratios required to service the student population. The cost submodel is described by several elements that are used in the determination of total facility cost. Among these elements are the construction of new school plants, special equipment, staff, land acquisition, current operating and transportation costs. The operational indices that are the outputs of the above three submodels are used as the quantitative basis for the selection among alternate policies. The operational indices include the racial and socio-economic composition of the school attendance area, the initial capital and operating cost estimates of the school system, transportation data and utilization rates of the school facilities.

(Available through ERIC No. ED 013528)

TN-25 REPORT ON THE ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT 1967 CONFERENCE ON SYSTEMS ANALYSIS TECHNIQUES IN EDUCATIONAL PLANNING. David S. Stoller, February 10, 1967.

The purpose of this meeting of the Organization for Economic Cooperation and Development (OECD) was to bring together educational planners, professional staff, and technical experts from the various OECD countries, and from the

staff of OECD, for international interchange of planning needs, technical methods, and for progress reports on technical studies. Previous OECD meetings in this series have been oriented to stimulating a dialogue among educational planners, systems analysts, and econometricians to explore the feasible interface between planning needs and technical capabilities. This meeting was particularly interesting in that a great proportion of the discussions and presentations were based on studies sponsored by educational agencies and institutions, whereas earlier meetings in the series relied heavily on the contributions by individual scholarly efforts. Typical examples of the presentations based on current educational applications: (1) "Applying Systems Analysis Techniques to Educational Administration and Planning," Department of Education and Science, United Kingdom; (2) "Admission to Schools, Colleges, and Faculties by Centralized Electronic Data Processing Systems," Swedish Planning Institute, Sweden; (3) "The Measurement of Equal Educational Opportunities," Office of Education, United States of America; (4) "Simulation and Rational Resource Allocation in Universities," Institute of Educational Research and the University of Toronto, Canada. The above partial listing does not include a number of the other presentations of outstanding character, depth, and relevance but serves to indicate the current involvement of educational agencies with systems analytical studies of vital problem areas.

(Available through ERIC No. ED 012518)

TN-26 A STUDY OF LONGITUDINAL PATTERNS OF FAILURE AMONG HIGH SCHOOL DROP-OUTS AND POORLY PERFORMING GRADUATES. Abt Associates, Inc., February 16, 1967.

This study was undertaken as part of the development of a planning model for evaluating elementary and secondary education (See TN-14). The study sought to determine quantitatively the relationship of variables in two areas: (1) do certain patterns exist with respect to poor performance in elementary and secondary school? (2) are there patterns of performance which distinguish the potential drop-out from his poorly-performing classmates who manage to complete school? As a consequence of this pilot study, the investigators feel that many poorly-performing high school students could have been identified early in their careers. Areas of critical performance were primarily in English courses and in mathematics. While many students showed a spreading pattern of failures, no significant pattern differences distinguished the drop-out from the graduate student. Boy drop-outs tended to leave steadily through high school, but girls left most frequently in the 12th grade.

(Available through ERIC No. ED 012486)

TN-22 COST-BENEFIT ANALYSIS OF EDUCATION. Alexander M. Mood and Richard Powers, March 30, 1967.

Cost-benefit analysis encounters severe difficulties when one attempts to apply it to education. A complete understanding of this problem is likely to be a number of years away. However, education is an important and expensive element in our society; any contribution that can be made to its effectiveness or efficiency will pay handsome returns. A comprehensive quantitative model of the American educational system will require resources applied over time. Such an analysis is mandatory; we cannot allocate over $50 billion per year to an activity without making substantial efforts to allocate it effectively. The implementation of an operational accounting system which will identify program costs will require widespread revision of the accounting systems of 25,000 school districts. As we acquire knowledge and methods, our understanding of the interactions that occur in the educational process, their relative sizes, their relationships, and what can be done to modify them will grow.

(Available through ERIC No. ED 012519)

TN-23 DROP-OUT AND RETENTION RATE METHODOLOGY USED TO ESTIMATE FIRST-STAGE ELEMENTS FOR DYNAMOD II. Edward K. Zabrowski and John T. Hudman, April 20, 1967.

DYNAMOD II is a computerized Markov-type demographic model of the time flows of the educational population (See TN-34). The model was built in two stages: in the first stage, the population was divided into male and female, and the transition probabilities for the respective educational groups were estimated. In the second stage, these probabilities were factored further to develop sex-race-age-educational category parameters. This note concentrates primarily on the procedures used in estimating the male/female flow parameters (transition probabilities) for elementary, secondary, and college students. Estimating formulas and data sources are given. An appendix is devoted to secondary school students' drop-out rates. The estimating procedures used for the remaining transition probabilities is discussed in TN-24 and TN-39.

TN-24 (Cancelled)

TN-30 COST MODEL FOR LARGE URBAN SCHOOLS. Richard J. O'Brien, April 26, 1967.

This note presents the mathematical equations required to estimate the cost resulting from the construction and operation of a large school facility. The equations are presented in parametric form, with only limited data presented for the estimation of parameters. The cost model is part of a larger model (Technical Note 24) that can be used to evaluate educational policy relative to the location and concentration of educational facilities within urbanized areas. The costing procedure is developed to the extent that new facilities and staffing cost are estimated independently of the existing system. Some of the cost elements which are discussed and for which mathematical formulas are given, are the following: construction of new school plants, personnel staffing, transportation requirements in terms of number of buses and daily operation, acquisition of special equipment and land and financing of capital. The mathematical formulas are presented as a function of student enrollment size where appropriate. The relationship between school enrollment size and cost is discussed in a general manner. An example of the cost estimating procedure is given for a large school enrollment (10,400) facility.

(Available through ERIC No. ED 013527)

TN-31 (Cancelled)

TN-32 ITEM RESPONSE ANALYSES OF THE EDUCATIONAL OPPORTUNITIES SURVEY TEACHER QUESTIONNAIRE. George W. Mayeske, Frederic D. Weinfeld, and Albert E. Beaton, Jr., May 18, 1967.

This report presents the results of an analysis of the item response alternatives selected by elementary and secondary teachers in responding to 44 of the questions from the Educational Opportunities Survey Teacher Questionnaire. The sample is composed of 36,241 elementary and 24,008 secondary teachers. The sample numbers for each item response alternative are adjusted by their sampling weights to estimate teacher population values. Estimated population values as well as estimated population percentages are given for each response alternative. In addition, the mean and standard deviation of scores on a contextual vocabulary test are given for the teachers selecting each item response alternative. These latter values are converted to standard scores with a mean of fifty and a standard deviation of ten for each question. A discussion is included of some selected results.

TN-33 (Cancelled)

TN-34 STUDENT-TEACHER POPULATION GROWTH MODEL: DYNAMOD II.
Edward K. Zabrowski, John T. Hudman, Tetsuo Okada, and Judith R. Zinter, May 29, 1967.

DYNAMOD II is a computerized Markov-type flow model which projects 108 separate population groups over selected intervals of time. These population groups are cross-classified as to sex, race (2 categories), age (6 categories), and educational status (3 levels of students and teachers, respectively) and an "Other" category. DYNAMOD II uses "transition probabilities" to move the population groups through time. These probabilities are estimates of the changes that a person in one classification in a given year will change classifications (or die) by the following year. The birth data used in the model are supplied in the form of projections in absolute numbers which are added in to the youngest age group at the appropriate time. After each year is projected, the population groups are subtotaled and printed out as desired. DYNAMOD II can provide estimates of the impact on the educational population of proposed policy changes or of sudden shifts in the structure of the educational system. For example, if policymakers wish to know what effect will be produced by a policy designed to decrease the elementary school teacher turnover by one percent, DYNAMOD II can supply not only information on the new levels of teacher projections, but also can provide estimates of the rate at which these adjustments will take place. Not only are these estimates possible for the various tiers of student and teacher structures in the model, but changes outside the educational system, such as in birth and death rates can be handled as well. It follows that the impact of policy changes on system characteristics, such as the student-teacher ratio, can also be estimated.

TN-35 AN ALGORITHM TO DETERMINE RELATIVE IMPORTANCE OF PROJECTS.
William K. Winters, May 31, 1967.

There are many characteristics which are relevant to determining the urgency of individual tasks composing the total workload of an organization: due date, priority number, etc. These characteristics must be made commensurable in order to provide a linear ordering of the tasks. This

note presents the mathematical description of the problem and furnishes two algorithms for constructing solutions. Two examples are discussed and several examples illustrate the mechanics of the algorithms for each. An appendix furnishes an ALGOL code for one of the solutions.

TN-36 METHODS OF PROJECTING BIRTHS. Tetsuo Okada, June 1, 1967.

This note presents the various methods currently in use for projecting births. In particular, the basic method of cohort-fertility (Bureau of the Census), and three alternative methods: (1) age-specific, (2) cohort-fertility (Scripps), and (3) marriage-parity-progression, are described. Finally, an overview is given of recent trends in birth projection modeling efforts and new approaches to the problem of predicting fertility.

TN-37 (Cancelled)

TN-38 SCHOOL SUBMODEL FOR LARGE URBAN SCHOOLS. Richard J. O'Brien, June 21, 1967.

The school submodel is a component of a model that can be used to evaluate educational policy relevant to the location and concentration of educational facilities within urbanized areas (see Technical Notes 24 and 30). The school submodel is concerned with the definition of the basic input data representing educational policy on facilities, staff and programs. The specification of these inputs, their interrelationships and the presentation of the data in the form necessary for the later evaluation (full model) of costs and effectiveness is the objective of this note. School facilities are defined in terms of the functional areas (measured in floor space) within the school plant required to provide a given program of service to the student population. Regular instructional, supplemental instructional and service and structure areas are considered. The regular instructional area requirements are determined through the application of straightforward space

per pupil factors. Supplemental requirements are considered from a probabilistic and deterministic approach. The deterministic approach defines space requirements in terms of frequency of scheduling availability of the use of the facility, and engineered space requirements. The probabilistic approach defines space requirements (and also staff requirements) in terms of the historical data of course selection and confidence levels of space and staff utilization based on the Poisson probability distribution. Service and structure areas are estimated through statistical factors. Staffing requirements are estimated through the application of standard statistical staffing ratios to different personnel categories. Some discussion is given on the relationship of scope of curriculum and utilization of specialists and enrollment size.

(Available through ERIC No. ED 013500)

TN-39 METHODOLOGY USED TO ESTIMATE FIRST-STAGE ELEMENTS OF THE TRANSITION PROBABILITY MATRICES FOR DYNAMOD II: TEACHERS AND EXTRA-SYSTEMS FLOWS. Edward K. Zabrowski, September 18, 1967.

This note is a continuation of the exposition of the transition probability estimation procedures first discussed in Technical Note Number 28. The procedures developed describe how estimates were obtained of the chances that a person in a given educational category in one year (e.g., male college students) will move to another educational category by the next year (e.g., male elementary school teachers). Specifically discussed is the development of the probabilities that college students will enter elementary, secondary or college teaching; that a teacher in one level in a given year will transfer to another level the next year (e.g., that college teachers will transfer to secondary school teaching); and that persons outside the educational system will enter one of the pre-defined educational levels: elementary, secondary or college students and elementary, secondary or college teaching. All estimates were developed from various documented sources.

TN-40 ESTIMATION OF SECOND-STAGE DROPOUT RATES FOR STUDENT-TEACHER POPULATION GROWTH MODEL (DYNAMOD II). Judith R. Zinter, August 28, 1967.

This note presents the methodology used to estimate dropout rates for DYNAMOD II, a computerized Markov chain model of student and teacher flows over time (see Technical Note 34). Dropout rates are estimated for elementary and secondary students by race and sex for the following age groups: less than 15, 15-19, 20-24, and 25-44 years of age.

TN-41 TWO COMPUTER PROGRAMS FOR FACTOR ANALYSIS. Carl E. Wisler, October 18, 1967.

This note describes two computer programs which are available for factor analysis using the General Electric Time-Sharing Computer System. One program obtains the principal components of a correlation matrix; the other makes an orthogonal transformation of the principal components using a varimax algorithm. The note includes brief descriptions of the algorithms, listings of the FORTRAN programs, sample problems and input instructions. The principal components analysis will accept up to fifty variables in the correlation matrix and will compute up to thirty principal components. The varimax analysis will accept up to ten principal components with up to fifty variables.

TN-42 TRANSITION PROBABILITIES FOR STUDENT-TEACHER POPULATION GROWTH MODEL (DYNAMOD II). Judith R. Zinter, September 8, 1967.

This note lists the transition probabilities in use in DYNAMOD II as of the date the note was published. These transition probabilities are estimates of the chance that an individual in a given sex-race-age-educational level category in one year will move to another feasible category by the following year. For a description of DYNAMOD II, see Technical Note 34.

TN-43 A BIBLIOGRAPHIC GUIDE TO OPERATIONS ANALYSIS OF EDUCATION. C. Marston Case and Stephen C. Clark, September 15, 1967.

This selected bibliography contains references to some recent books and journal articles dealing with the application of operations analysis to educational system problems.

TN-44 (Cancelled - Superseded by TN-65)

TN-45 DYNAMOD II IN A TIME-SHARING ENVIRONMENT. William K. Winters, October 23, 1967.

This note describes in detail the development of the FORTRAN computer program for the Student-Teacher Population Growth Model (DYNAMOD II), a model of the flows of students and teachers over time. (See Technical Note 34). The program is written for use on the GE-235 Time-Sharing System. Flow charts of the source program and definitions of the program variables are included in the note as well as complete listings of the source program and data files and sample listings of output.

TN-46 METHODOLOGY FOR AN EDUCATIONAL ATTAINMENT MODEL. Carl E. Wisler, September 5, 1967.

Presents method to achieve better understanding of aggregate educational attainment and capacity through the development of analytical models. A descriptive model is formulated wherein a given level of attainment for a population is expressed as a linear function of explanatory variables including the next lower level of attainment. The complete model is composed of a set of these interlocking linear equations. Under certain assumptions the parameters of the system may be estimated by the standard statistical method of least squares. It is pointed out that these same assumptions lead to a method of casual inference which may be used as a basis for comparing alternative hypotheses about the explanatory variables.

TN-47 OCCUPATION EDUCATION REQUIREMENTS ANALYSIS. William C. Morsch and Jeanne Griest, December 12, 1967.

Develops a method of projecting vocational education needs based on projections of employment by major industries and evaluates the usefulness of this method. Projections were made at Standard Metropolitan Statistical Area (SMSA) and rest-of-State levels. The model was based on employment projections (for 11 industries by State and selected SMSA level) which were allocated among occupations according to coefficients produced from the 1960 Census. By means of a conversion matrix the occupations were transformed into educational requirements using 7 major vocational education fields. Results of this calculation were computer runs indicative of the number of people who will be employed in jobs for which training in a specific vocational field would have equipped them. The technique was designed to allow comparison with projections of other agencies. Suggestions for further development and improvements of the technique are included in the analysis. Details of the 2 computer runs used are described in an appendix.

TN-48 A MODEL FOR STUDENT ACHIEVEMENT. George W. Mayeske, December 21, 1967.

A description of the results to date of work being conducted on the development of a model for student achievement. Steps employed in the reduction of the large number of variables into a fewer number of indices and the utilization of these indices in regression analyses are described. All analyses are based upon the sample of ninth grade schools and students obtained as part of the Educational Opportunities Survey. Some of the more salient findings are that both school achievement and school resources (including such things as the number of pupils per teacher, the teacher's view of his working conditions and the school's special staff and services) are highly related to the socio-economic status and racial-ethnic composition of the student body. The influence of the schools is bound up with the kinds of students that they get initially. Consequently, when the schools are equated for the kinds of students that they get they tend also to be equated for the influence that they have on these students. The schools play an important role in promoting student achievement and the extent of this involvement appears to be greater for higher socio-economic status and white students than for lower socio-economic status and non-white students.

TN-49 CORRELATIONAL AND FACTORIAL ANALYSES OF ITEMS FROM THE EDUCATIONAL OPPORTUNITIES SURVEY TEACHER QUESTIONNAIRE. Frederic D. Weinfeld, George W. Mayeske, and Albert E. Beaton, Jr., December 29, 1967.

Presents the results of analyses intended to reduce the number of items from the teacher questionnaire of the Educational Opportunities Survey so that the volume of data processing and complexity of later analyses could be reduced. Meaningful groupings of variables were sought using factor analytic techniques. These analyses showed that the teacher questionnaire items could be reduced to the following eight meaningful groupings for both elementary and secondary teachers: (A) Experience, (B) Teaching Conditions, (C) Localism of Background, (D) Socio-Economic Background, (E) Training, (F) College Attended, (G) Teaching Related Activities, and (H) Preference for Student Ability Level.

TN-50 CORRELATIONAL AND REGRESSION ANALYSES OF SCHOOL ACHIEVEMENT FOR SCHOOLS OF VARYING RACIAL COMPOSITION. Frederic D. Weinfeld, George W. Mayeske, and Albert E. Beaton, Jr., December 29, 1967.

This study utilized a representative national sample of secondary schools from the Project TALENT data bank to ascertain the relationship of a variety of school attributes such as facilities, teacher's salaries and socio-economic status to school achievement. The measures of school achievement were the average scores obtained by the twelfth grade students in each school on standard tests of English and Mathematics achievement. Both correlational and regression analyses of English and Mathematics achievement on the different school attributes were conducted in order to determine which attributes were most highly related to achievement and which combination of attributes could be used to explain differences in achievement.

All the analyses were conducted on three different groups of schools. These groups were: All schools, schools with one to forty-nine percent of the student body Negro and, schools with fifty to one hundred percent of the student body Negro.

The analyses showed that many of the correlations and regressions were different for schools of differing racial composition. The most salient findings are that Study Halls, Teacher Tenure, Number of Books in the Library, Number of Teachers, Beginning Salary of Male Teachers, Percent of Students going to summer school and Regional Accreditation are positively related to achievement in English and Mathematics for all groups of schools. This is after the schools within each group were first equated for differences in School Size, Quality of Housing, Percent of Income from Local Sources, Per-Pupil Expenditure, Age of School Building and Number of Grades in the School.

The results show that the manner in which different school attributes relate to school achievement is different for schools of differing racial composition and suggests that they may be different when stratifications are made for other variables such as school size, region of the country and rural-urban differences. The results support the need for an empirically sound and useful taxonomy of schools. One criterion for such a taxonomy might be that school atrributes are maximally related to achievement within each taxonomic group and maximally different between groups.

TN-51 ITEM RESPONSE ANALYSES OF THE EDUCATIONAL OPPORTUNITIES SURVEY NINTH GRADE STUDENT QUESTIONNAIRE. Frederic D. Weinfeld, George W. Mayeske, and Albert E. Beaton, Jr., December 29, 1967.

This report presents the results of the analysis of questionnaire item responses made by 133,136 - 9th grade students in the Educational Opportunities Survey. Estimated population numbers and percentages are given for each response alternative. In addition, the standardized mean and standard deviation of the weighted composite score are given for the students selecting each item response alternative. The method of deriving the weights for the composite score by factor analysis is discussed. The technique of criterion scaling is proposed as a method of solving the problems of scaling discrete categorical information, providing for non-linear scales, and estimating missing data. The rationale of criterion scaling, which maximizes the correlation between the scale of a variable and the criterion, is presented.

TN-52 ON PARTITIONING THE EXPLAINED VARIATION IN A REGRESSION ANALYSIS. Carl E. Wisler, January 17, 1968.

Describes a new concept for interpreting the results of regression analyses. Procedures are given for partitioning the explained variation such that the contribution which two or more regressors make in common can be identified. The measures so developed may be regarded as extensions of the notion of unique sum of squares. The methodology has been applied to the analysis of data from the Educational Opportunities Survey, one example of which is used to illustrate the value of the new measures.

TN-53 DYNAMICS OF ACHIEVEMENT: A STUDY OF DIFFERENTIAL GROWTH OF ACHIEVEMENT OVER TIME. Tetsuo Okada, David S. Stoller, and Frederic D. Weinfeld, January 17, 1968.

Data acquired from the Educational Opportunity Survey of student performance on tests of reading comprehension, verbal ability and mathematics were used to obtain estimates for achievement by single years of grade (for grades 6 through 12) in terms of grade level equivalents for various racial and ethnic groups. It was found that there exist large differentials in average achievement rates among the various student groups, ranging from 3 to 5 years behind the national mean for some Negro groups to 3 years or more ahead for some white student groups. Groups from other races, namely, American Indians, Mexican-Americans and Puerto Ricans, achieve at rates intermediate to those for Negro and white students. Oriental-American students approximate achievement rates for white students.

TN-54 DYNAMICS OF ACHIEVEMENT: DIFFERENTIAL GROWTH OF ACHIEVEMENT FOR NEGRO AND WHITE STUDENTS BY SMSA/NON-SMSA AND REGION. Tetsuo Okada and David S. Stoller, January 17, 1968.

Data acquired from the Educational Opportunity Survey for Negro and white students are broken down into SMSA/Non-SMSA categories and regions within a given SMSA/Non-SMSA. Analysis of the data is presented in terms of (1) SMSA/Non-SMSA for a given region and (2) analysis of different geographic regions for both SMSA and Non-SMSA areas. Some regional rank comparisons of achievement in average test scores are also presented. When comparisons of average test score results or grade level equivalents are made in terms of Negro and white students by SMSA/Non-SMSA and within regions, the white students in every region, regardless of metropolitan or non-metropolitan, have higher average scores in every test at every grade level. For any given group of regions, Negro students show much more variability in average test scores than white students. Both Negro and white students exhibit an ever-increasing variability in average test scores as they progress from grade to grade but the Negro students show a greater variability. In comparing the possible influence on achievement of metropolitan versus regional residence, for Negroes, regional differences have an increasingly greater long-term influence on achievement test scores. For white students, metropolitan or non-metropolitan residence seems to be a more important factor than regional differences in the achievement of superior test scores.

TN-55 A MODEL FOR THE DETERMINATION OF SCHOOL ATTENDANCE AREAS UNDER SPECIFIED OBJECTIVES AND CONSTRAINTS. Richard J. O'Brien, January 22, 1968.

The Urban Education Model is an analytical model that is to be used in the evaluation of educational policy relative to the location and grouping of school complexes within an urban environment. The particular aspect of that task described in this note is the determination of the required school attendance areas when restrictions have been placed on the racial and/or social composition of each school plant. These attendance areas are generated in a manner that insures the assignment of students to schools which minimizes the total "distance" traveled by all students. "Distances" is measured either in distance itself or some function of distance such as time or cost. The methodology presented allows for the systematic study of the relationship between compositions of schools and objectives such as the minimization of total student travel time. Inputs required to conduct such analyses

would include the existing distribution of school plants, the location of proposed plants, and the geographical distribution of students defined by their racial, social and age characteristics.

TN-56 RESEARCH ON ACHIEVEMENT DETERMINANTS IN EDUCATIONAL SYSTEMS: A SURVEY. Jerolyn R. Lyle, January 22, 1968.

This survey of research on educational achievement reviews problems researchers have had in isolating input-output relations in public elementary and secondary school systems. Studies using student achievement as the school system output exhibit difficulty in specifying inputs with sufficient analytic and empirical clarity for them to be precisely differentiated from one another. Much past research has been unintegrated. It, therefore, has been easy to misinterpret. Only recently do researchers give evidence of communality of approaches and goals. Longitudinal data at school and individual student levels is needed if future research is to fulfill its promises. The review includes work done between 1960 and the present time.

TN-57 OUTLINE OF AN URBAN EDUCATIONAL MODEL. Richard J. O'Brien and Jerolyn R. Lyle, January 22, 1968.

The Urban Educational Model is an analytical, symbolic model that is to be used in planning the location and enrollment size of urban schools. Large educational complexes on the order of the "Great High Schools" of Pittsburgh and the "Educational Parks" are among the educat-onal alternatives that may be considered by the methodology presented. It is evident that for a meaningful evaluation of alternatives, relative to the urban school plants currently being considered, a methodology for the systematic definition and evaluation of alternatives is needed. The Urban Education is a step in that direction.

TN-58 ITEM RESPONSE ANALYSIS OF THE EDUCATIONAL OPPORTUNITIES SURVEY PRINCIPAL QUESTIONNAIRE. C. W. Mayeske, K. A. Tabler, J. M. Proshek, F. Weinfeld, and A. Beaton, March 11, 1968.

This report analyzed the responses of elementary and secondary principals to each of the items from the principal questionnaire. The tabulations presented give the number and percent of elementary and secondary principals responding to each questionnaire item alternative and also the number and percent who failed to respond to each item. In addition, the average scale score of four criteria items were determined for each response alternative for each item on the questionnaire for both elementary and secondary principals. The four items utilized as the criteria were the total enrollment in the principal's school, the salary of the principal, the location of the school based on a rural-urban dimension, and a description of the pupils served by the school in terms of the occupations of the parents. Along with a description of the procedures utilized in the analyses, some selected results were discussed.

TN-59 CORRELATIONAL AND FACTORIAL ANALYSES OF ITEMS FROM THE NINTH GRADE STUDENT QUESTIONNAIRE OF THE EDUCATIONAL OPPORTUNITIES SURVEY. C. W. Mayeske, F. Weinfeld, and A. Beaton, March 11, 1968.

This study reduced the number of variables from the Educational Opportunities Survey Questionnaire for Ninth Grade Students into a smaller number of indices using factor analytic techniques. The indices developed were labeled as:

Expectations for Excellence
Socio-Economic Status
Social Confidence
Attitude Toward Life
Family Structure and Stability
Educational Desires and Plans
Study Habits

All of these indices were found to be moderately correlated with Student Achievement, Racial-Ethnic Differences and Sex.

Multiple regression analyses showed that Socio-Economic Status and Family Structure and Stability were potent variables in predicting achievement and the other attitudinal indices. Other analyses showed that after equating students for differences in Socio-Economic Status and Family Structure and Stability, Sex was an important explanatory variable for Study Habits, and Racial-Ethnic Differences was important in explaining Achievement and Attitude Toward Life.

TN-40 CORRELATIONAL AND FACTORIAL ANALYSIS OF ITEMS FROM THE TWELFTH GRADE STUDENT QUESTIONNAIRE OF THE EDUCATIONAL OPPORTUNITIES SURVEY. G. W. Mayeske, J. M. Proshek and W. M. Cohen, April 26, 1968.

This study reduced the number of variables from the Educational Opportunities Survey Questionnaire for Twelfth Grade Students into a smaller number of indices using factor analytic techniques. The indices developed were found to be similar to those for the Ninth Grade Students and were:

Expectations for Excellence
Socio-Economic Status
Social Confidence
Attitude Toward Life
Family Structure and Stability
Educational Desires and Plans
Study Habits

All of these indices were found to be moderately correlated with Student Achievement, Racial-Ethnic Differences and Sex.

Multiple regression analyses showed that Socio-Economic Status and Family Structure and Stability were potent variables in predicting Achievement and the other attitudinal indices. Other analyses showed that after equating students for differences in Socio-Economic Status and Family Structure and Stability, Sex was an important explanatory variable for Study Habits, and Racial-Ethnic Differences was important in explaining Achievement and Attitude Toward Life.

TN-61 CORRELATIONAL AND REGRESSION ANALYSES OF DIFFERENCES BETWEEN THE ACHIEVEMENT LEVELS OF NINTH GRADE SCHOOLS FROM THE EDUCATIONAL OPPORTUNITIES SURVEY. G. W. Mayeske, K. A. Tabler, F. Weinfeld, A. Beaton, and J. M. Proshek, March 11, 1968.

This report discusses the steps involved in reducing the 400 variables from the Educational Opportunities Survey into a smaller number of indices so that the volume of data processing and complexity of later analyses can be reduced. Descriptions are given of the indices obtained from these analyses.

Correlational and regression analyses of these indices and other variables with the achievement levels of ninth grade schools are given. The correlations of school and student body variables with: the rural-urban location of the school, the number of students enrolled in the school, the principal's training, pupil teacher ratio, school achievement levels, the student body's socio-economic status and the student body's racial and ethnic composition are presented and discussed.

Regression analyses of the student body's Achievement levels, Expectations, Attitude Toward Life, Educational Plans and Study Habits, against student body and school variables showed that the student body variables made a greater relative contribution than the school variables. The school variables were found to be highly correlated with the student body variables of Socio-Economic Status and Racial-Ethnic composition as well as with school Achievement. Analyses of the overlap of the student body and school variables showed that almost all of the predictable variance in Achievement was contained in the student body-school overlap. Schools that are equated for the kinds of students that they get initially they tend also to be equated for differences in their size, and the home background and racial composition of the student body through partial correlation techniques, such variables as: pupil teacher ratio; specialized staff and services; teachers' turnover, experience, salary, race, class size and verbal facility continued to show low to moderate relationships with Achievement.

More detailed analyses showed that for Achievement, the student body variables had their greatest overlap with the school personnel and personnel expenditure variables. This suggests that this latter set of variables may be most important in promoting Achievement.

Regional analyses were conducted of the regression of Achievement and Attitude indices on student body variables. Considerable regional differences in the dependence of school Achievement on student body home background and Racial-Ethnic composition were discerned. For schools where the dependence of Achievement on the Socio-Economic Status of the students was lowest the school variables made a greater contribution to Achievement than did the student body variables. This highlights not only the importance of Socio-Economic Status in studying school Achievement but suggests that the school variables that contribute to Achievement may differ for students from different socio-economic backgrounds.

TN-62 CORRELATIONAL AND FACTORIAL ANALYSES OF ITEMS FROM THE EDUCATIONAL OPPORTUNITIES SURVEY PRINCIPAL QUESTIONNAIRE. G. W. Mayeske, K. A. Tabler, F. Weinfeld, A. Beaton, and J. E. Proshek, April 26, 1968.

The purpose of these analyses was to reduce the number of items from the Principal's questionnaire so that the volume of data processing and complexity of later analyses could be reduced. Meaningful groupings of variables were sought using factor analytic techniques. These analyses showed that the Principal questionnaire items could be reduced to the following fourteen groupings for both elementary and secondary schools:

I	Physical Plant and Facilities
II	Principal's Experience
III	Principal's Training
IV	[illegible] Opinions Expressed
V	Instructional Facilities
VI	Specialized Staff and Services
VII	Teaching and Ability Grouping
VIII	Frequency of Testing
IX	Pupil Transfers
X	Remedial Programs
XI	Free Milk and Lunch Programs
XII	Accreditation
XIII	Age of Texts
XIV	Availability of Texts

The relationship of these indices to student and teacher variables are given in an earlier report in this series.

EH-63 CHARACTERISTICS DIFFERENTIATING UNDER- AND OVERACHIEVING ELEMENTARY SCHOOLS. W. B. Fetters, E. F. Collins, and J. W. Smith, March 12, 1968.

This is one of a series of reports describing recent statistical studies performed by the Data Analysis Branch. The purpose of this study is to analyze some under- and overachieving elementary schools in order to determine the characteristics in which they differ. Knowing how they differ with respect to school characteristics should suggest why they differ with respect to achievement and indicate some steps that might be taken to improve the quality of the nation's elementary schools. Discrimination between the two sets of schools are identified with respect to teacher and principal responses to survey queries. The basic data utilized in the development of this report were extracted from the Educational Opportunities Survey.

Over- and underachieving schools were found to differ significantly with respect to many characteristics. These characteristics are associated with, but are necessarily proven causes of, poor quality schools. Some of the more pronounced differences as indicated by teachers and principals were:

a. Parents of children in underachieving schools exhibit comparatively little interest in either their childrens' school work or in the schools themselves.
b. The poor instructional equipment associated with underachieving schools.
c. More pupils per teacher in underachieving schools.
d. The reduced likelihood of underachieving schools having an art or music teacher.
e. The disproportionately large number of disadvantaged children attending underachieving schools.
f. Teachers low rating of pupils in underachieving schools regarding their academic abilities, efforts, interest in learning, disciplinary habits and absenteeism.
g. The lower reputation of underachieving schools among educators.
h. The higher ratio of non-white teachers in underachieving schools.

TR-64 ITEM RESPONSE ANALYSES OF THE EDUCATIONAL OPPORTUNITIES SURVEY STUDENT QUESTIONNAIRES. G. V. Noyeske, F. D. Weinfeld, A. E. Beaton, Jr., W. Davis, W. B. Fetters, and E. E. Nixson.

This report presents analyses of questionnaire item responses from the first, third, sixth, ninth and twelfth grade student questionnaires that were administered as part of the Educational Opportunities Survey. The analyses include the: (1) number and percent of students responding to each questionnaire item alternative; (2) the number of students who failed to answer each question and; (3) achievement means and standard deviations for students responding to each questionnaire item alternative.